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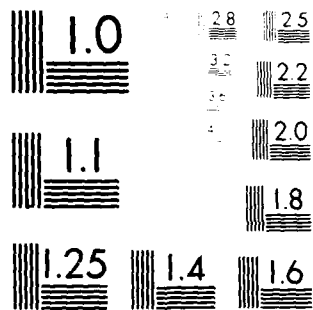
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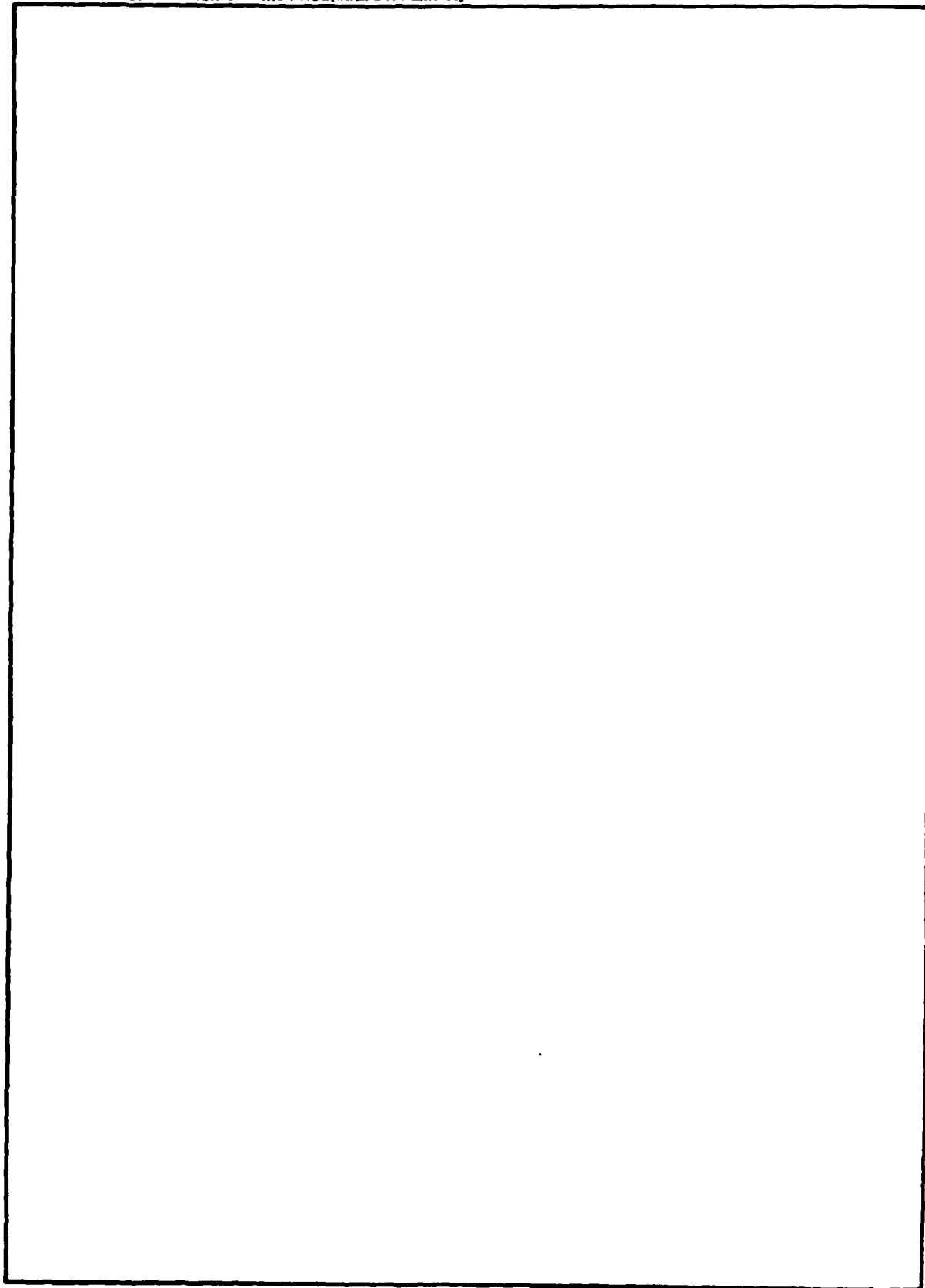


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US ARMY WAR COLLEGE
INDIVIDUAL RESEARCH BASED ESSAY

INDUSTRIAL MOBILIZATION - THE ABILITY TO RESPOND

BY

LIEUTENANT COLONEL THOMAS L. PRATHER, JR.

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INDUSTRIAL MOBILIZATION - THE ABILITY TO RESPOND

This paper is designed to assess the condition of our industrial base and its ability to respond to the needs of the nation with military equipment in a crisis. This objective will be pursued with a review of our nation's historical approach to the subject; discussion of problem areas; an analysis of current initiatives to correct these problems; and recommended future courses of action. My interest in the subject is the result of working as a staff officer in industrial preparedness at Headquarters, United States Development and Readiness Command (DARCOM), in the mid-1970's. In addition, an assessment will be made on industrial base plans from that period to determine the degree to which those plans continued on to effect positive trends in the condition of the base.

My eagerness to explore this topic was stimulated further by various speakers here at the Army War College. On occasion, information regarding the condition of the industrial base was quite alarming. For example, in a discussion on mobilization production shortfalls, one speaker observed that from D-day to D+24 months, our industrial output could obtain approximately 75 percent of our mobilization production requirements. The remaining 25 percent would take in excess of two years to produce. The types of equipment and/or material contained in the 25 percent was not defined. However, one wonders if the items

unavailable could be such critical equipment as jet aircraft, tanks, or ammunition.

In his letter of transmittal to the Chairman, Committee on Armed Services, House of Representatives, forwarding the report of the Defense Industrial Base Panel, 29 December 1980, Republican Richard H. Ichord, Chairman, Defense Industrial Base Panel, made the following observations:

The panel finds that there has been a serious decline in the nation's defense industrial capability that places our national security in jeopardy. An alarming erosion of crucial industrial elements, coupled with a mushrooming dependence on foreign sources for critical materials, is endangering our defense posture at its very foundation.¹

How does one answer the question of our production base's ability to respond in a crisis? From the brief observations of the foregoing, one would have to view the base's responsiveness with much skepticism. Could it be that the perceptions of industrial mobilization are as dismal today as they were in the mid-1970's? Do we still have the shocking revelation of aging facilities and machinery, shortages of critical materials, increasing lead times, skilled labor shortages, declining productivity growth, inadequate budgets, and burdensome governmental regulations and documentation?

To provide a basis for discussion, industrial preparedness, the backbone of industrial mobilization, must be defined. Industrial preparedness is any plan, action or measure necessary to establish and maintain an industrial base, both government-owned and privately-owned, that is required to support current, wartime or other contingency military requirements. It includes industrial preparedness measures such as modernization and preservation of production facilities plus contributory items and services for planning with industry to accomplish the

complete realm of industrial preparedness.

Within this framework, the Department of Defense (DOD) is responsible for planning the most economical methods of achieving industrial preparedness objectives. The authority for implementing industrial preparedness activities is the Defense Production Act of 1950, the first comprehensive legislation covering the subject since the 1920's. Under Executive Order 11490, as amended by Executive Order 22921 of 1976, DOD is charged to: (1) maintain a minimum essential government industrial base; (2) accomplish all planning necessary to meet military requirements both internally and with industry; and (3) rely upon private industry to the maximum extent possible.²

Problems regarding the capability of the industrial base did not surface overnight. In 1975, for example, the Joint Committee on Defense Production of the Congress expressed concern that the industrial base might not be capable of responding to our military needs. The DOD, also cognizant of the problem, in 1976, initiated a Defense Science Board (DSB) study group to address defense industrial preparedness. The DOD's final report was published November 1976. It addressed the interrelationship of the industrial base with the requirements for various conflicts, crisis or wars. It considered warning time, short-to-long war transition, war reserve material needs and culminated in a series of recommendations that could have enhanced preparedness if acted upon.³

For reasons unknown, possibly due to limited monetary resources and change in administrations, DOD took no action on the findings from the study group. Instead, in 1980, it initiated another DSB study group. The findings and recommendations of this group reiterated those of the 1976 study group. In essence it stated that: (1) the conclusions

reached and recommendations of 1976 remained basically unchanged; (2) no action had been taken on the 1976 findings; and (3) little changed in four years except some improvement in conventional ammunition war reserve material stocks.⁴

With the above revelation, we have the answer to our concern as to whether improvements were effected in the base since the mid-70's. Why was the base allowed to deteriorate further? As evidenced throughout this century, our nation either ignores or forgets the necessity for a strong industrial base until threatened by the sounds of battle. In some instances, such as the case in World War II, the overwhelming ability of our society and industry to respond rapidly has resulted in a false sense of security. That sense being "we have always responded to a crisis on time in the past; we can do it again if the situation dictates." Our society can learn from the pitfalls of its history and/or those of other nations, and take prudent actions which will preserve and insure our democratic freedom. On the other hand, we can be a people who ignore the lessons of history and perish. The consequences are that finite. As General Brehon Somervell, Commanding General, Army Services Forces, World War II, said, "preparation for the preservation of our freedom must come in peacetime, and we must pay for it in money and inconvenience. The alternative . . . is payment in blood and extinction."⁵

The United States' attempt to meet war requirements through industrial preparedness began with the experiences of World War I. The almost total lack of preparation and the resulting problems of mobilizing industry caused the Armed Forces to recognize the need for peacetime planning. Thus, the National Defense Act of 1920 resulted in the establishment of the first formal industrial preparedness organization

for this country.⁶

However, the dedication that marked post-World War I mobilization planning effort was not matched by a corresponding effort in promoting investment in the production base. Because we "fought the War to End All Wars," we compounded the arms and equipment problems by dismantling the modest World War I production base, except some of the Army Arsenals, Navy Shipyards, government-owned ammunition plants, and aircraft factories. We also failed to stockpile adequate strategic material and war reserves of military equipment. Therefore, the initial burden of producing ground weapons and ammunition for World War II fell on government owned facilities, as the allies absorbed terrible personnel attrition to buy the US time to direct its industrial might for a total war effort.⁷

Although unprepared for World War II, the industrial base of the US responded to the challenge and unleashed a seemingly unlimited amount of war material at unprecedented rates.

The true potential of the industrial base was demonstrated with a vengeance, building 50,000 aircraft; 20,000 tanks; 80,000 artillery pieces and 50,000 trucks per year. In March 1944, 9,117 military aircraft were built in just a single month. Additionally, American shipyards were building 'liberty' ships in 50 days, with a total of 5,200 large warships being built during the period of the war.⁸

When Field Marshal Rommel observed the presence of the Sherman tank at El Alamein in 1942, he realized the Germans would not win the war. He was convinced that Germany could not match a country whose industrial capacity was such that it could mobilize, design, and produce in quantity an acceptable battle tank, and deliver it to the front in adequate numbers to influence the battle in less than eleven months.⁹

It is that caliber of responsiveness, in quantity and quality, that

encourages inaction in the industrial preparedness arena today. At any rate, the US retained most of its essential industrial bases after the war. It also constituted war reserve stocks and stockpiled strategic raw materials. However, the preoccupation with nuclear weapons hindered this mobilization effort. It was perceived that nuclear weapons precluded conventional war and our demonstrated World War II production performance could be repeated without much additional peacetime investment. With the conclusion of the war, the American people grew weary of war fighting and any measures associated with guaranteeing peace, and craved for consumer goods and services. Thus, our industry properly turned its attention to fill this need. Only negligible resources were used for national defense. As we experienced over and over again, our preoccupation with peacetime pursuits obscured the necessity for industrial preparedness.¹⁰

The Korean War conflict again reminded us that we should not neglect our industrial base and expect responsive support in an emergency. Although a limited production base was retained prior to that conflict, dollar limitations restrained the United States' ability to maintain adequately the World War II built, Army-owned ammunition plants. This caused severe ammunition shortages early in the conflict. Nevertheless, there was an industrial base, and portions were reactivated. The US mobilization effort for World War II resulted in the growth of a private sector defense industry and its sustainment by post-war production requirements. It was this segment that produced much of the requirements for the Korean War. In addition, the trend away from the more costly government-owned facilities in favor of privately-owned industries was established. The private sector could produce war material at a faster rate for less cost.¹¹

The industrial base responded adequately to the gradual escalation of the Vietnam War over a ten year period. However, there were several problems. Among them were: (1) unexpected duration and intensity of the conflict (allowed planners little opportunity to control buildup); (2) lack of formal war declaration (caused competing for war material procurement with commercial production resulting in sporadic serious shortages); and (3) competitive procurements for material at lowest price (caused shift from planned mobilization producers who previously signed agreements for wartime production with government). The result was many new, sometimes unqualified, contractors becoming one-time low bid suppliers, while many older, more experienced firms, became disillusioned with the military hardware business and discontinued defense related production in favor of civilian markets.¹²

Another example of the unresponsive industrial base occurred shortly after the Arab-Israeli conflict in 1973. In response to the call for assistance, the US resupplied the Israeli forces with over 1,000 M60 tanks obtained from the active Army inventory, Prepositioned of Material Configured to Unit Sets (POMCUS) assets, and war reserve stocks in Europe. After the war, a decision was made to accelerate production of the tanks from 30 to over 100 per month to replenish the seriously depleted US tank inventory. To the surprise of Army officials, the primary contractor for the M60 tank, Chrysler Corporation, could deliver only a maximum of 40 tanks per month due to its limited supply of tank hulls and turret castings from commercial foundries. An investigation revealed that only four active foundries existed to produce tank castings; all others with this capacity had been closed. Because of a near-monopoly operating situation, each of the active

foundries had a heavy commercial backlog and expressed extreme reluctance to make any long-term commitment to produce the tank castings. Another factor bearing on the issue was that castings provided a very low profit margin while utilizing a very large share of total plant capacity.¹³

After prolonged negotiations, only two foundries would agree to supply the castings: The Blaw-Knox Corporation, East Chicago, Indiana (the only current supplier), and the Birdsboro Company, Philadelphia, PA. In both instances, however, the Army had to fund the capital investment needed to expand production. Blaw-Knox was paid over \$6 million to expand its active production line; and Birdsboro received over \$12.4 million to develop a second foundry source for castings. Additionally, \$11 million was spent renovating and repairing equipment at the Army-owned Detroit Tank Plant. The problem was exacerbated further by the Environmental Protection Agency (EPA) which declared that no new foundries be built unless able to meet EPA air quality standards.¹⁴

The production base for main battle tanks did not improve with that experience. In 1981, the closing of the foundry at Wheeling, West Virginia, further reduced the capacity to cast hulls and turrets. Accordingly, maximum production capacity for M60A3's was reduced to approximately 80 a month. Current plans call for the production base to support approximately 90 M1 Abrams tanks per month. At full mobilization, the Army will need to produce both models at a combined rate of 700 per month. It is clearly evident that it is not possible with current facilities.¹⁵

The foregoing examples give many clues as to why the industrial base is unsound. Our industrial preparedness planning efforts in this

century have failed to achieve desired objectives. The private sector has been knee-jerked time after time to meet our production goals. We never seem to profit by previous mistakes. How many more chances will we have to prove our national resolve in this area? Before every conflict, our nation has never been totally prepared to provide war fighting material to the American soldier. The pattern is always the same: a well-funded effort when combat is imminent; and when the threat is gone or the need reduced, funding disappears.¹⁶

Our industrial preparedness planners must find a solution to this problem and bridge the gap between the two extremes. This is particularly necessary in today's environment when the entire defense budget is in question. Industrial preparedness is difficult to defend because it is expensive and affords little apparent tangible benefits. As a result, the validity and credibility of the program are questioned by Congress, the general public, and even decision makers in DOD. It is an area increasingly exacerbated by inflation and higher energy costs. Admittedly, benefits may not be realized until the country is at war. But we have numerous examples from which to draw. Therefore, its (the program) importance should not require defending. On the other hand, our nation's mindset is not likely to change that easily. It is inconceivable to expect the type of responsiveness evident in World War II. We are a different nation now in terms of national will, resources, industrial might, motivation, etc. We are not the industrial giant of yesteryear. Today there are limitations beyond our immediate sphere to correct which will preclude a World War II type response to a future national crisis.

Another issue that has tarnished mobilization planning efforts is

that of the short versus long war scenario. DOD has applied different approaches to the matter. The concept of short wars is historical. However, the concept is rooted in the issue of affordability, in terms of future program dollars and our current posture due to past funding. In the affordability context, we must be ready to fight the initial phases of the war first, regardless of the conflict's duration. Recognizing this, near term readiness receives top priority with mid-term modernization, second, and long-term sustainability, third priority.¹⁷

The short war scenario is one in which the next war (in Europe) will start with little or no warning and one NATO force must be prepared to fight with on hand assets. By contrast, the long war is the one which lasts several years with a build-up prior to and/or during the conflict. The issue of short versus long war becomes critical when the short war philosophy is expressed as absolute, i.e., the next war will definitely last only a few days or months. The Office of Management and Budget (OMB) in the FY 82-85 Program Objective Memorandum (POM) exercise, proposed to eliminate the Army's industrial preparedness operations account which provides for industrial mobilization planning and maintaining our extensive reserve industrial base. OMB thought its action logical since the Army's planning, as OMB perceived, was based on the short war scenario. As discussed earlier, this type thinking is symptomatic of the misunderstandings surrounding industrial preparedness. The perception is that the base is slow and only of value in a long war. However, the Army must be prepared for either war, short or long. The OMB view ignores the requirement for a viable base to reconstitute forces. Reconstituted forces enable the US to pursue a realistic foreign policy to deter or to fight, if necessary, a follow-on conflict.¹⁸

While our nation's industrial mobilization efforts have been one of limited resources, apprehension, confusion, disorganized planning, our potential adversary has built a powerful and responsive industrial base. Traditionally, the Soviet threat has been viewed in terms of the massive numbers of men and material which our country would face in the event of a conflict. However, the added qualitative capability of that force coupled with its quantitative superiority magnifies that threat. It concerns more than tanks and artillery. It includes a vast war-production base, one that not only has been modernized, but also produces high quantities of high-quality equipment for export to other nations.¹⁹

There is another aspect of this build-up which is sometimes overlooked in an assessment of Soviet military strength. The fact that the Soviets are operating their industrial base at significant rates of production greatly enhances their ability to support military operations. The fully active status of a "hot" production base also provides significant logistical benefits in preparation for either a short term conflict or full-scale mobilization for war. The Soviets are less enamored of the short war concept than are our fiscal conservatives. Assuming the availability of materials and adequately-sized facilities, a hot base allows for immediate expansion of production, resulting in quick, responsive increases in the supply of war material to meet urgent requirements.²⁰

In spite of the strains on their economy, the Soviets show no evidence of deviating from their goals of increasing military supremacy and extending their quantitative and qualitative advantages in fielded equipment.²¹

This total commitment to military production over the past few years has resulted in a massive inventory of war material. The sheer numbers of weapons stockpiled, both strategic and conventional, are not

only impressive but disconcerting when compared to the total weapons inventory maintained by the western alliance. During the 1970's the Soviets outspent the US in every category of defense while continuing to modernize their production base with new technology and machinery. Conversely, our base's ability to respond to a surge production capability in an emergency, and to sustain our forces in an extended conflict is highly speculative.²²

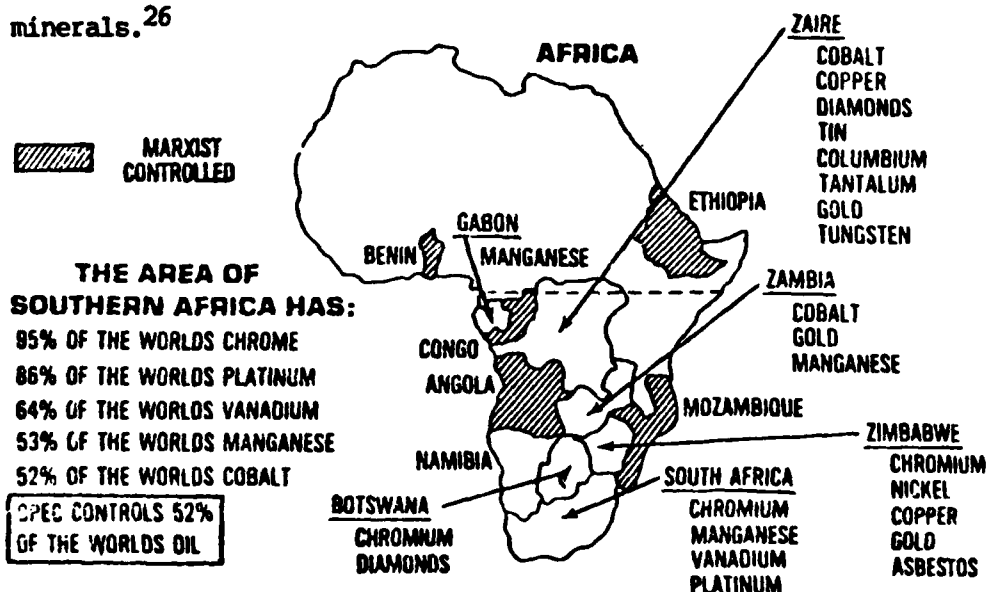
With evidence of the Soviet's viable production base and suggestions of problems in the US base, we turn to the most prevalent problems in our base. The first is our dependency on foreign sources for critical minerals and materials. The Strategic and Critical Materials Stockpiling Act, originally enacted in 1946, provided for the strategic and critical materials stockpile in sufficient quantities to sustain the US for a period of not less than three years in event of a national emergency. During the period 1946 to 1960, materials were actively procured for the stockpiles. In 1962, however, the size of the stockpile was considered excessive and, in the following year, large amounts considered excessive of revised goals were sold. From 1946 to 1979, stockpile policies changed direction numerous times in established goals for individual commodities. From 1964 to 1975, stockpile holdings of such commodities as copper, aluminum, and nickel were liquidated. Incidentally, these represented the minerals we either did not mine or relied on other nations to supply. In the early 1980's, the stockpile of items vital to our national security were far below standards: 60 percent of 62 family groups and individual metals did not meet established goals.²³

The declining posture of the stockpile not only resulted from a failure of successive administrations to request, or the Congress to




















appropriate funds to make purchases for the stockpile, but also from the failure to replenish the stockpile from revenues generated from the sale of commodities from the stockpile. Frequently, sales of commodities during the 1960's and 1970's were made for purposes of helping to balance the federal budget. Instead of using the revenues to buy needed materials such as cobalt, titanium, platinum and tantalum, these funds were transferred to the general fund of the US Treasury for other uses. With the exception of additions such as chrysotile asbestos, jewel bearings, and small diamond dies, no major additions were made to the stockpile from 1960 to 1981.²⁴

Our alarming dependence on imports of critical industrial raw materials from the Soviet Union and potential unstable southern African sources creates a potentially dangerous flaw in our nation's defense preparedness posture. The price and availability of vital materials such as cobalt, chromium, and manganese are almost completely dependent on geopolitical events in southern Africa. The adaption of Marxist regimes by five African countries south of the Sahara has contributed to the political instability in this region and the likelihood of future supply disruptions. Only a few more nations would have to fall under Soviet influence for the elements of a supercartel to coalesce. Control of these primary sources of strategic mineral reserves means the power to gain political and economic concessions through the manipulation of supplies to consumer countries.²⁵

The chart below reflects our dependency on Africa for critical minerals.²⁶








The chart below depicts the United States' worldwide dependence on foreign sources for selected critical minerals.²⁷

MINERALS AND METALS	0 25 50 75 100	MAJOR SOURCES
COLUMBIUM		BRAZIL, THAILAND, CANADA
MICA (SHEET)		INDIA, BRAZIL, MADAGASCAR
STRONTIUM		MEXICO, SPAIN
MANGANESE		BRAZIL, GABON, S. AFRICA
TANTALUM		THAI., CAN., MALAYSIA
COBALT		ZAIRE, BELG.-LUX, ZAMBIA, FIN.
PLATINUM GROUP METALS		S. AFRICA, U.S.S.R., U.K.
BAUXITE & ALUMINA		JAMAICA, AUST., SURINAM, GUINEA
CHROMIUM		S. AFRICA, U.S.S.R., TURKEY, S. RHODESIA
ASBESTOS		CAN., S. AFRICA
TIN		MALAYSIA, THAI, BOLIVIA, INDONESIA
FLUORINE		MEX., SPAIN, ITALY, S. AFRICA
NICKEL		CAN., NORWAY, NEW CALEDONIA, DOMIN. REP.
POTASSIUM		CAN., ISRAEL
GOLD		CAN., SWITZ., U.S.S.R.
ZINC		CAN., MEX., HONDURAS
TUNGSTEN		CAN., BOLIVIA, KOREA
CADMIUM		CAN., AUST., BELG.-LUX.
IRON ORE		CAN., VENEZUELA, BRAZIL, LIBERIA

The foregoing illustrates our obvious strategic vulnerability. The US has become dangerously vulnerable to an OPEC-type mineral cartel. The dangers of our high dependence for essential items cause: price

escalation, shortages, inflation, dollar devaluation, trade deficits, and economic stagnation. Our nation is more than 50 percent dependent upon foreign sources for over half of the approximately 40 minerals critical to our economic and defense needs.²⁸

For the sake of comparing, the Soviets are virtually self-sufficient in those minerals critical to military or defense production. The following chart provides an illustration of Russia's mineral abundance.²⁹

MINERALS AND METALS	0 25 50 75 100	MAJOR SOURCES
ASBESTOS	EXPORT	
FLUORINE		MONGOLIA, CHINA, THAI.
TIN		MALAYSIA, U.K., BOLIVIA
NICKEL	EXPORT	
CADMIUM	EXPORT	
ZINC	EXPORT	
POTASSIUM	EXPORT	
ANTIMONY		YUGOSLAVIA
TUNGSTEN		CHINA, MONGOLIA
COLUMBIUM		
MICA (SHEET)		
STRONTIUM		
MANGANESE	EXPORT	
TANTALUM		
COBALT		
BAUXITE & ALUMINA		YUGOSLAVIA, HUNG., INDIA
CHROMIUM	EXPORT	
PLATINUM-GROUP METALS	EXPORT	
TITANIUM ORE	EXPORT	

The issue of dependency is further exacerbated by the fact that many US firms, due to such tangibles as labor costs, environmental standards, taxes, and transportation costs, are setting up plants in other countries for processing raw materials. Even if raw materials were available, we do not have the industrial capacity to process them into finished products at the rate required. Titanium is an example. Although there is a reliable source for the ore (rutile), from which titanium sponge is made, the US lack of processing/fabrication capacity in the industrial sector impacts on price and leadtimes. Between 1978 and 1980, the price of refined nickel increased 65 percent; columbite ore, 250 percent; titanium sponge, 80 percent; refined cobalt, 117 percent; and tantalum ore, 300 percent. The price escalation is expected to continue as our dependency on foreign sources grows.³⁰

Increased lead times have a multiplier effect on basic price increases as production lines are time oriented. Failure to meet schedules cause bottlenecks and choke points which adversely affect production and cost. Below are examples of lead time increases:³¹

	<u>1978</u>	<u>1980</u>	<u>INCREASE</u>	<u>END USE</u>
TITANIUM FORGINGS	33	117	84	JET ENGINES
ALUMINUM FORGINGS	32	81	49	HYDRAULIC SERVOCYLINDERS
INTEGRATED CIRCUITS	26	56	30	AVIONIC SYSTEMS
CONNECTORS	28	45	17	ELECTRICAL AND AVIONIC SYSTEMS
TITANIUM PLATE	25	92	37	ARMOR
STEEL FORGINGS	36	82	46	LANDING GEARS

(Figure in weeks)

As discussed previously, the closure of forging and casting facilities and the lack of construction of new facilities also cause production disruptions which reduce or eliminate surge capacity. In the 1970's hundreds of foundries were closed as a result of environmental, health and safety laws and regulations imposed by the federal government.³² The previously cited closing of the forging facility at Wheeling, West Virginia, was due as much to these laws as to the lack of adequate defense orders.

Another problem is manpower turbulence. Despite the fact that industrial preparedness operations are labor-intensive, there is an extremely high turnover of personnel (particularly at plant level, where it is due to the win-or-lose nature of the business on the large contracts). This significantly increases the cost of producing defense material - not only because workers fail to learn to improve their efficiency, but also because a wage premium is paid to a skilled worker as an incentive to accept a job with an uncertain future. Additionally, because of the highly technical nature of the work and the lack of normal price competition, there is a very high and quickly climbing ratio of nonproduction workers to production workers. Combine this with the increasing number of support personnel and the results are a high and growing overhead rate, which contributes to rising production costs.³²

Couple these manpower problems with that of our nation's continued lagging productivity and we have the formula for disaster. Our nation was once the envy of the world because of its ability to invent methods to produce goods better, with better quality and at lower cost. Now the nation is last in increasing the amount of goods and services produced per employer when compared with other nations. Our low productivity

increases cost and affects the nation's ability to meet emergency requirements. From 1948 to 1966, productivity rose to a 3.2 percent average annual rate; approximately the same as its historical long term growth rate. From 1966 to 1973, the growth rate was 2.1 percent, and 1.1 percent from 1973 to 1977. Since 1978, the nation's productivity rate has been almost negative. During the 1950's and 1960's, the Consumer Price Index (CPI) rose about two percent per year for all goods and services. Firms invested in new plants and equipment and our standard of living was constantly rising. However, during the late 1960's and early 1970's the CPI increased significantly and the productivity growth rate started to decline.³³

Now lesser developed industrialized nations combine high technology with cheap labor to produce and sell everything from steel to high technology electronics and aircraft. The net effect is a closing of the gap with the US to produce more goods per worker. As our productivity growth rate declines, US industry is less competitive and our world market share continues to decline.

From productivity, we move to a discussion of quality problems, evident in both the private and defense sectors. Low quality contributes to our declining industrial productivity. However, the implications of slipping quality in the defense industry are far greater than in any other sector. The consequences of low quality in military hardware such as aircraft, missiles, combat vehicles, etc. are more disastrous should failures occur on the battlefield than in the civilian or private sector. But defense producers have experienced serious quality problems. Among these have been defective engine turbine parts, defective tank automotive engine parts, defective engine bearings and races,

defective aircraft structures, and defective welds. All of these cost in productivity, dollars, readiness and, ultimately, our ability to defend our nation.

For items which do not have commercial applications, i.e., military peculiar ammunition, large caliber weapons, and heavy combat vehicles, DOD must provision facilities for production. In this area, the profit motive and fluctuating requirements basically preclude contractor ownership as private industry cannot afford to maintain idle plants during periods of low demand. Currently, these facilities and associated equipment can be classified as old, inefficient, oversized, and frequently unnecessary. Very little investment has been evident in the defense industry for modernization of plants and equipment. Of the DOD-owned plants currently in use, only about a third have been built since World War II. The majority were built during World War II, and a few earlier. Much of the equipment in these plants is of Korean War Vintage (1950-1955). Only the electrical and electronic equipment, mostly purchased in the 1960's, keeps the average age of industrial plant equipment in the current inventory under twenty years. Still, most of it exceeds fifteen years of age, and 45 percent is at least twenty years old. This situation contributes to the cost of defense material and seriously limits the responsiveness of the base to contingencies.³⁴

Another costly part of the base is Industrial Plant Equipment (IPE). IPE is primarily metalworking machinery with an acquisition value of \$1,000 or more per machine, and other special tooling and test equipment. Since the majority of this equipment is not necessary to support the civilian sector, IPE becomes the backbone of the mobilization base. Its availability is imperative for current procurements and continuation of a viable industrial base. The equipment is included

in active and reserve plants, and some is retained in Plant Equipment Packages (PEP's). (PEP's are equipment retained by DOD for production capacity beyond the capability of industry to provide in satisfying emergency demands.) This equipment represents a high investment for the services. The Army, for example, has approximately 117,000 pieces of IPE in the inventory with an acquisition cost of \$1.4 billion.³⁵

As is the case with facilities, the most compelling problem with IPE is age. Of the metal-cutting and metal-forming tools inventory, 70 percent will exceed their useful service life in 1982. The commercial tool industry is not capable of making a significant impact on either the age or condition of the equipment. Many smaller manufacturers have gone out of business, causing spare parts to become unavailable. Even if funds were made available to quickly fill voids or replace antiquated equipment, the machine tool industry will not be able to produce new machines soon enough to have a significant impact on mobilization production. Since the acquisition cost has almost tripled in replacement value, cost prohibits replacement IPE from the machine tool industry even if not difficult to obtain quickly. But the problem is real with the inability of the machines to keep close tolerances as tool age increase and tolerance demands of new products grow tighter. Since most of the equipment has not been evaluated since placed into storage, an assessment must be made of its present condition before any fixes can be applied.³⁶

Lack of adequate capital investment in new plants and equipment is not only one of the contributing factors to our declining productivity but also to our industrial responsiveness. There is a high correlation between capital investment and productivity. For the 1960-1976 period,

data show that countries with the highest ratios of investment to GNP had the highest rates of productivity growth for manufacturing. During this period the US ranked last behind Japan, West Germany, the Netherlands, Belgium, Italy, France, Canada, and the United Kingdom. It is no coincidence that Japan, with more than twice the ratio of investment to GNP as the US had over this period, also had over four times as high an average annual increase in productivity. Japan has approximately half the GNP as the US, yet it spends the same amount for investments. This is an indication of Japan's priorities, and also gives an explanation for its success in improving productivity vis-a-vis our nation's intentions regarding the matter.³⁷

Why the low capital investment in the US? Business investment of profits has been a traditional source of funds for capital investment. Inflation severely reduced available profit by increasing operating costs. Even companies with substantially increasing sales often experience a decrease in retained earnings for investment purposes.³⁸

In the defense industry, other cash demands make matters worse. For example, the significantly higher rates of interest (interest expense not allowable cost on defense contracts), rising fuel costs (which particularly hurts those on fixed-price contracts), more numerous and expensive proposals competing for a smaller number of awards, and the fact that contractors are often asked for help in a shrinking dollar environment add to cash demands.³⁹

The basic problem lies in the ability of defense firms to raise money. Their price-to-earnings ratio and their bond ratings are low (about half as good as those of their civilian counterparts), and thus most investment firms are reluctant to put their funds into the defense sector. The financial community's pessimism regarding the defense

industry rests primarily in its belief that profits are too low in comparison to the risks.⁴⁰ Common concerns throughout financial institutions and private industry regarding defense business are: (1) profits are too low for the risk; (2) uncertainty as to the ability to win further contracts and fulfill current ones; (3) uncertainty as to future requirements or procurement instability; and (4) certain peculiarities (such as excessive management, and the propensity to change requirements in mid-stream).

What can our nation do to improve and/or eliminate the lack of responsiveness by its defense industrial base? Although much has to be accomplished, some of the current initiatives to improve the base's responsiveness are encouraging. Whether these initiatives will consummate soon enough and in sufficient quantity to make a difference remains questionable. But an organized offensive has begun. Concerned governmental, military and industrial leaders are organizing efforts to correct the deficiencies in the production base. Unlike previous administrations, the current US leadership has given much emphasis to improving the nation's industrial capability and defense deterrence. The Reagan administration is providing the opportunity to reestablish and revitalize our defense mobilization capability as part of the reindustrialization of our country. If we fail to take appropriate action now, the world situation could dictate, within the near future, a very untenable position for our national security and well-being. Reviewing the situation, one finds startling similarities between today's problems and those which existed prior to World War II.

While the base's limited surge capacity is depressing (the case of the main battle tank is a case in point), there are other examples of

positive initiatives to reverse this problem. In the ammunition area, a program for modernization and expansion of facilities has been implemented by the Army since 1970. Budgeted at \$9.4 billion, it is a twenty-nine year plan (1970-1999) for high productivity in a pollution free environment. There are approximately twenty-one plants undergoing modernization and expansion. However, the largest step for the Army is the five year construction program and equipment installation, valued at \$398 million, for the Mississippi Ammunition Plant. Scheduled for completion in fiscal year 1983, the plant will contain the latest advances in manufacturing technology to integrate fully all steps of projectile manufacture, except the production of fuses, explosives, and propelling charges. It will be capable of producing 120,000 packaged rounds of 155 mm, M483A1, per month. (The M483A1 is the latest generation of Improved Conventional Munitions (ICM).)⁴¹

Another example is the large-scale, in-house modernization effort at Watervliet Arsenal, New York, the only current US producer of thick-walled cannon tubes. The Army is mid-way through a \$256 million investment program, scheduled for completion in 1985, to ensure a modern and responsive cannon-producer base. A similar renovation is planned for Rock Island Arsenal, Illinois, where towed artillery, weapons mounts, recoil systems, and crew-served weapons are produced. Construction is scheduled to start in fiscal year 1984.⁴²

Although just a tip of the iceberg, these examples represent significant capability improvements for the base when completed. It is the type of commitment required for mobilization enhancement. Our defense mobilization planners can no longer afford to size production facilities to support peacetime requirements on a multi-shift basis. This approach eliminates surge capability. We need to address the minimum requiremen

of producing peacetime requirements with one shift. DOD must intelligently apprise Congress of the consequences of dollar shortfalls which result in or forces us into peacetime facilitization planning only. Thus, future facilitization, such as the new ammunition facilities discussed previously, must have the capability to support significant surge production. Immediate action is required to develop a surge capacity for the main battle tank. This will be a tremendous challenge for the Army with the investment required and the questions regarding the effectiveness of the M-1 tank. Despite these obstacles, DOD needs to take positive action before Congress to move this and similar program shortfalls off dead center.

Likewise, immediate action is necessary to reduce and eliminate our reliance upon foreign sources for critical minerals and metals. Enactment of the Strategic and Critical Materials Stockpiling Revision Act of 1979 was a way of recognizing the problem. But the emergence of the Federal Emergency Management Agency (FEMA), the governmental agency solely responsible for civilian population protection in emergencies, has resulted in measures which put laws into action. Responsible for the nation's stockpile, FEMA has initiatives to expand domestic material industries, develop programs to initiate domestic production of cobalt, guayule rubber, and refractory bauxite. FEMA has also been allocated dollar resources for outright stockpile purchases. In fact, the purchase of cobalt this year represents the first purchase of that commodity in over twenty years. With continued emphasis by the administration, along with dedicated support from federal agencies and the Congress, tremendous improvements will be evident. Our nation's decisionmakers must maintain the offensive in this area if the base is to be

viable. At present, the scarcity of these materials impacts on lead times, production capability, energy, and the transportation associated with producing combat equipment. As previously stated, the scarcity of materials means the US is vulnerable to political and economic blackmail, should a supplier choose such a course of action. After years of neglect and poor management, correcting the problem represents a herculean task. But it must be accomplished soon, as most of our national leaders recognize. Industry can produce only up to the availability of critical materials.

Our nation could relieve some of the base's woes by using Title III of the Defense Production Act of 1950 as originally intended. Entitled "Expansion of Productivity Capacity and Supply," it provides authority for expanding supplies of materials and provides for: (1) guaranteed loans to expedite delivery of services for national defense; (2) direct government loans to private business for expansion of capacity; and (3) purchase or commitment to purchase metals, minerals, and other materials for government use to encourage exploration, development and mining of critical and strategic minerals and metals; (4) subsidizing supplies to insure availability of critical minerals and raw materials; and (5) authorizing installation of additional equipment, facilities, or improvements to the same whether government or commercially owned. This legislation provides the vehicle for many of the actions that should be taken. In 1975, however, Congress limited the act's scope by preventing action without prior Congressional appropriation of funds. Today, no expansion of programs, such as those achieved for \$8.4 billion during the Korean War Conflict, is possible. With that money, the US doubled aluminum production; initiated nickel mining; and increased copper mine capacity by a quarter. Although we are not engaged presently in a

conflict such as the Korean War, the condition of the base dictates an offensive of the magnitude reflected then or one greater in intensity to catch up. Recently, there was minimal appropriations of Title III funds for limited low level research and development contracts.⁴³ The time is ripe to use the act for its intended purposes.

Much of our nation's productivity problems stem from our inability to make sacrifices. Our mindset is typically "what can I get from the government." Little or no consideration is given to the well-being of the nation. As citizens, we need to give up some of the "good life" to improve our economic plight. We continually spend beyond our means, demand more governmental services, and complain about increased federal spending. The tendency is to let the "other guy" make the sacrifices and solve the problems. Other causes of the productivity problem include: increased energy costs; inflation; decline in the work ethic; increased cost imposed by government regulations; industry shift from a manufacturing to a service economy; increased labor costs; composition of the labor force (older, more women, inexperienced workers, etc.); size of the market; reduction in the investment of research and development funds; and increased age of capital stock and the lack of capital investment. Again, the coordinated efforts of the executive branch, Congress, DOD, and industry will be required to change this dismal situation. President Reagan's announced intentions, upon assuming the presidency, to control inflation, enhance productivity, and stimulate private and business investments should produce favorable results. His specific attempts to: (1) deregulate the economy; (2) encourage capital formulation through investments; (3) decelerate monetary growth; (4) provide personal and business tax relief; and (5) accelerate cost recov-

ery systems, require the cooperation and support of the public. The recent ratification of labor union contracts with Ford and General Motors Corporations could be indications of change by labor in recognizing that continued demand for outlandish salaries and benefits, coupled with a sluggish economy, could collapse the automobile industry, eliminate their jobs, and decimate the economy of the nation. Our nation needs a sound economy to improve the plight of productivity and our nation's industrial might. The president's economic initiatives need time to work in spite of unfavorable political overtones. Meanwhile, the citizenry must be prepared to "tighten their belts" and exercise some degree of patience.

Of all the efforts to encourage private industry's participation in the defense business during peacetime and the follow-on benefit of long term capital investment, the recent changes in the defense acquisition process will be the most beneficial. DOD does not have a good track record in providing long term stability in its military budget process. But the new procedures should increase stability, make the acquisition process more efficient, and decrease the acquisition time of military hardware. Of the changes most significant are the emphasis on multi-year procurement. Multi-year procurement should eliminate much of the uncertainty for defense contractors. With this form of procurement, the government is committed to: (1) longer term contracts which allow contractors to make more economical use of resources; and (2) protecting the contractor's investment in the event the commitment cannot be honored. Multi-year contracts should also provide tremendous savings for our nation. Specifically, these contracts: (1) provide overall project stability, (2) allow purchase of raw materials and components in economical quantities, and (3) stabilize the work force. The most

important benefit (and one that could drastically improve our overall posture) is that the private contractor is encouraged to increase capital investment. This means a better opportunity to recapture investment costs. Thus, better loan terms and the spreading of enhanced productivity costs over a larger base. Finally, multi-year procurement allows more efficient ordering of critical materials. Materials can be received early with the added savings justifying storage costs.⁴⁴

Coupled with intelligent planning and a thoroughly defined statement of defense requirements, multi-year procurement offers a greater opportunity for our nation to eliminate inefficiency and the unresponsiveness attributed to the industrial base.

Participants in MOBEX-80 sessions voiced concern regarding industrial preparedness planning. In order to meet defense needs, industry must know our requirements, in what quantity, and when needed. The ongoing initiative to solve this problem will prove very effective. Specifically, an acquisition plan is being formulated for mobilization in two parts: the first is a prioritized list of items to be produced in a crisis; and the second is the quantitative requirements. Scheduled for annual review, this will build confidence and credibility in our planning with industry - that material procured support the nation's needs.⁴⁵

Finally, we need to formulate plans which suggest, in an actual crisis, our willingness to accept equipment other than the ultimate desired. In other words, we need plans which identify acceptable commercial substitutes. These plans should be reviewed annually and identify specific manufacturers which would produce additional items in a crisis.

In summary, our nation has viewed the necessity for a responsive mobilization base in terms of our own selfish and isolationist views. We should, instead, view the base as part of our nation's total defense arsenal. It is, in fact, a vital part of our deterrent force. We need to convey to any potential adversary our resolve and determination to maintain the resources and the ability which will enable us to respond decisively in a national emergency. History has proven that a strong national defense is the best insurance for peace. Perceived weakness could tempt an adversary to take risks he would not otherwise take if the risks for losing appeared very high. Our industrial base must be viewed from a global perspective not national. As a leading power, nations throughout the world look to the United States to maintain peace and stability. We cannot fulfill this responsibility without a viable and responsive industrial base. We find our defense industrial base not as viable as it should be. However, for the first time in decades, we have the national leadership which has demonstrated the willingness to lead us back to our rightful position as the world's leading power. What other mandate is necessary?

ENDNOTES

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2. Association of the US Army (AUSA), Army Industrial Preparedness: A Primer on What It Takes to Stay Until the War is Over, p. 11.

3. US Congress, pp. 19-20.

4. Ibid., p. 20.

5. AUSA, p. 2.

6. Ibid., pp. 2-3.

7. Ibid., p. 3.

8. Ibid., p. 3.

9. Ibid., p. 2.

10. Ibid., pp. 3-4.

11. Ibid., p. 4.

12. Ibid., p. 4.

13. Ibid., p. 5.

14. Ibid., p. 6.

15. Guthrie, John R. General, "The Threat, Means to Meet It Dominate DARCOM Objectives," p. 88.

16. AUSA, p. 6.

17. Vawter, Roderick L., "Mobilizing the Industrial Base," p. 10.

18. Ibid., pp. 10-11.

19. Keith, Donald R. General, "Strong Industrial Base Vital to Readiness," p. 192.

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21. Keith, p. 192.
22. Ibid., pp. 192-193.
23. US Congress, pp. 28-29.
24. Ibid., p. 29.
25. Slay, Anton V. General, "Erosion of the Defense Industrial Base," p. III-6.
26. Ibid., p. III-6.
27. Ibid., p. III-2.
28. US Congress, p. 25.
29. Slay, p. III-5.
30. Ibid., p. III-5.
31. Ibid., p. III-17.
32. US Congress, p. 13.
32. Gansler, Jacques, "Underlying Economic Factors," p. 70.
33. Slay, p. IV-4.
34. Gansler, pp. 57 and 70.
35. AUSA, p. 19.
36. Ibid., pp. 20-21.
37. Slay, p. V-1-2.
38. Ibid., p. V-2-3.
39. Gansler, p. 61.
40. Ibid., p. 61.
41. AUSA, p. 19.
42. Guthrie, p. 88.
43. Slay, pp. VII-1 - VII-3.
44. Ibid., pp. VII-27 - VII-28.
45. Keith, pp. 196-197.

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